What is claimed is:

1. A semiconductor substrate processing apparatus, comprising:

a carry-in and carry-out section for carrying in and carrying out a semiconductor substrate having a surface on which a circuit is formed, in a dry state;

a plated metal film forming unit for forming a plated metal film on said semiconductor substrate which has been carried in;

a bevel etching unit for etching a peripheral edge portion of said semiconductor substrate;

a polishing unit for polishing at least part of said plated metal film on said semiconductor substrate; and

a transport mechanism for transporting said semiconductor substrate between said units.

2. The semiconductor substrate processing apparatus according to claim 1, comprising a cleaning unit for cleaning said semiconductor substrate which has been polished.

3. The semiconductor substrate processing apparatus according to claim 1, comprising an annealing unit for annealing said semiconductor substrate.

4. The semiconductor substrate processing apparatus according to claim 1, wherein said plated metal film forming unit comprises an electroplating unit.

5. The semiconductor substrate processing apparatus according to claim 1, comprising a film thickness measuring instrument and/or a detection sensor for measuring and/or detecting a film thickness of a film and/or a surface state of a film formed on said semiconductor substrate.

6. The semiconductor substrate processing apparatus according to claim 5, wherein said film thickness measuring instrument and/or said detection sensor performs measurement and/or detection at least at one of points in time before or after formation of a barrier layer, before or after formation of a seed layer, before or after formation of said plated metal film, before or after annealing treatment, before or after polishing treatment, and before or after formation of a plated cover film.

7. The semiconductor substrate processing apparatus according to claim 1, comprising a seed layer forming unit for forming a seed layer on said semiconductor substrate.

8. The semiconductor substrate processing apparatus according to claim 7, wherein said seed layer forming unit comprises an electroless plating unit.

9. The semiconductor substrate processing apparatus according to claim 1, comprising a reinforcing seed layer forming unit for forming a reinforcing seed layer on said semiconductor substrate.

10. The semiconductor substrate processing apparatus according to claim 9, wherein said reinforcing seed layer forming unit comprises an electroless plating unit.

11. The semiconductor substrate processing apparatus according to claim 9, wherein said reinforcing seed layer forming unit comprises an electroplating unit.

12. The semiconductor substrate processing apparatus according to claim 1, comprising a barrier layer forming unit for forming a barrier layer on said semiconductor substrate.

13. The semiconductor substrate processing apparatus according to claim 1, comprising a cover plating unit for forming a plated cover layer on said semiconductor substrate.

14. The semiconductor substrate processing apparatus according to claim 1, wherein said polishing unit comprises at least a first polishing unit and a second polishing unit, and said first polishing unit and said second polishing unit are different in a material of an object to be polished.

15. The semiconductor substrate processing apparatus according to claim 1, wherein said polishing unit comprises at least a first polishing unit and a second polishing unit, and said first polishing unit and said second polishing unit are identical in a material of an object to be polished.

16. The semiconductor substrate processing apparatus according to claim 1, wherein said polishing unit comprises at least a first polishing unit and a second polishing unit, and said semiconductor substrate is polished by said first polishing unit, and then polished by said second polishing unit.

17. The semiconductor substrate processing apparatus according to claim 1, wherein said semiconductor substrate processing apparatus has two or more of polishing units, and said semiconductor substrate is polished by one of said polishing units.

18. The semiconductor substrate processing apparatus according to claim 1, wherein said polishing unit has at least two polishing steps.

19. A semiconductor substrate processing apparatus, comprising:

a carry-in and carry-out section for carrying in and carrying out a semiconductor substrate having a surface on which a circuit is formed, in a dry state;

a plated metal film forming unit for forming a plated metal film on said semiconductor substrate which has been carried in;

a bevel etching unit for etching a peripheral edge portion of said semiconductor substrate;

a polishing unit for polishing at least part of said plated metal film on said semiconductor substrate; and

a transport mechanism for transporting said semiconductor substrate between said units;

wherein said plated metal film forming unit and said bevel etching unit are interchangeable.

20. The semiconductor substrate processing apparatus according to claim 19, comprising a cleaning unit for cleaning said polished semiconductor substrate;

wherein said plated metal film forming unit, said bevel etching unit, and said cleaning unit are interchangeable.

21. The semiconductor substrate processing apparatus according to claim 19, comprising an annealing unit for annealing said semiconductor substrate;

wherein said plated metal film forming unit, said bevel etching unit, and said annealing unit are interchangeable.

22. The semiconductor substrate processing apparatus according to claim 19, comprising a film thickness measuring unit for measuring and/or detecting a film thickness of said film and/or a surface state of said film formed on said semiconductor substrate;

wherein said plated metal film forming unit, said bevel etching unit, and said film thickness measuring unit are interchangeable.

23. The semiconductor substrate processing apparatus according to claim 19, comprising a reinforcing seed layer forming unit for forming a reinforcing seed layer on said semiconductor substrate;

wherein said plated metal film forming unit, said bevel

etching unit, and said reinforcing seed layer forming unit are interchangeable.

24. The semiconductor substrate processing apparatus according to claim 19, comprising a seed layer forming unit for forming a seed layer on said semiconductor substrate;

wherein said plated metal film forming unit, said bevel etching unit, and said seed layer forming unit are interchangeable.

25. The semiconductor substrate processing apparatus according to claim 19, comprising a barrier layer forming unit for forming a barrier layer on said semiconductor substrate;

wherein said plated metal film forming unit, said bevel etching unit, said seed layer forming unit, and said barrier layer forming unit are interchangeable.

26. The semiconductor substrate processing apparatus according to claim 19, comprising a cover layer plating unit for forming a plated cover layer on said semiconductor substrate;

wherein said plated metal film forming unit, said bevel etching unit, and said cover layer plating unit are interchangeable.

27. A semiconductor substrate processing apparatus, comprising:

a carry-in and carry-out section for carrying in and carrying out a semiconductor substrate having a surface on which a circuit is formed, in a dry state;

a plated metal film forming unit for forming a plated metal film on said semiconductor substrate which has been carried in;

a bevel etching unit for etching and removing at least one of said plated metal film, a seed layer and a barrier layer formed at a peripheral edge portion of said semiconductor substrate;

an annealing unit for annealing said semiconductor substrate; and

a transport mechanism for transporting said semiconductor substrate between said units.

28. The semiconductor substrate processing apparatus according to claim 27, wherein said plated metal film forming unit, said bevel etching unit, and said annealing unit are interchangeable.

29. The semiconductor substrate processing apparatus according to claim 27, comprising a film thickness measuring unit for measuring and/or detecting a film thickness of said film and/or a surface state of said film formed on said semiconductor substrate;

wherein said plated metal film forming unit, said bevel etching unit, said annealing unit, and said film thickness measuring unit are interchangeable.

30. The semiconductor substrate processing apparatus according to claim 29, wherein said film thickness measuring unit has an alignment function for said semiconductor substrate.

31. The semiconductor substrate processing apparatus

according to claim 27, wherein in said plated metal film forming unit, plating treatment and cleaning treatment are performed in such a state that said semiconductor substrate is held by a substrate holding portion.

32. The semiconductor substrate processing apparatus according to claim 27, wherein said plated metal film forming unit comprises a substrate holding portion for holding said semiconductor substrate, an anode disposed above a surface, to be plated, of said substrate, and a cathode electrode for passing an electric current in contact with said substrate, and performs plating while a plating liquid impregnated material comprising a water retaining material is placed in a space formed between said surface to be plated and said anode.

33. The semiconductor substrate processing apparatus according to claim 27, wherein in said plated metal film forming unit, plating treatment, and cleaning and drying treatment are performed by raising and lowering said semiconductor substrate so as to correspond to respective operating positions, while said semiconductor substrate is held by a substrate holding portion.

34. The semiconductor substrate processing apparatus according to claim 27, wherein said plated metal film forming unit holds said semiconductor substrate such that a surface, to be plated, of said semiconductor substrate faces upward, seals a peripheral edge portion of said surface, to be plated, of said semiconductor substrate with a seal in a watertight manner, has an anode disposed

above said surface to be plated in proximity to said surface to be plated, has a cathode electrode for passing an electric current in contact with said semiconductor substrate, and performs plating while a plating liquid is held in a space formed by said surface, to be plated, of said semiconductor substrate and said seal.

35. The semiconductor substrate processing apparatus according to claim 27, wherein said plated metal film forming unit comprises a substrate holding portion for holding said semiconductor substrate such that a surface, to be plated, of said semiconductor substrate faces upward, an anode disposed above said surface, to be plated, of said semiconductor substrate, a cathode electrode for passing an electric current in contact with said semiconductor substrate, and a pure water supply nozzle, and simultaneously cleans said semiconductor substrate and said cathode by supplying pure water from said nozzle after completion of plating treatment.

36. A semiconductor substrate processing apparatus, comprising:

a carry-in and carry-out section for carrying in and carrying out a semiconductor substrate having a surface on which a circuit is formed, in a dry state;

a plated metal film forming unit for forming a plated metal film on said semiconductor substrate which has been carried in;

a polishing unit for polishing at least part of said plated metal film on said semiconductor substrate; and

a transport mechanism for transporting said semiconductor

substrate between said units;

wherein in said plated metal film forming unit, plating treatment and cleaning treatment are performed in such a state that said semiconductor substrate is held by a substrate holding portion.

37. A semiconductor substrate processing apparatus, comprising:

a carry-in and carry-out section for carrying in and carrying out a semiconductor substrate having a surface on which a circuit is formed, in a dry state;

a plated metal film forming unit for forming a plated metal film on said semiconductor substrate which has been carried in;

a polishing unit for polishing at least part of said plated metal film on said semiconductor substrate; and

a transport mechanism for transporting said semiconductor substrate between said units;

wherein said plated metal film forming unit comprises a substrate holding portion for holding said semiconductor substrate, an anode disposed above a surface, to be plated, of said substrate, and a cathode electrode for passing an electric current in contact with said substrate, and performs plating while a plating liquid impregnated material comprising a water retaining material is placed in a space formed between said surface to be plated and said anode.

38. A semiconductor substrate processing apparatus, comprising:

a carry-in and carry-out section for carrying in and carrying out a semiconductor substrate having a surface on which a circuit is formed, in a dry state;

a plated metal film forming unit for forming a plated metal film on said semiconductor substrate which has been carried in;

a polishing unit for polishing at least part of said plated metal film on said semiconductor substrate; and

a transport mechanism for transporting said semiconductor substrate between said units;

wherein in said plated metal film forming unit, plating treatment, and cleaning and drying treatment are performed by raising and lowering said semiconductor substrate so as to correspond to respective operating positions, while said semiconductor substrate is held by a substrate holding portion.

39. A semiconductor substrate processing apparatus, comprising:

a carry-in and carry-out section for carrying in and carrying out a semiconductor substrate having a surface on which a circuit is formed, in a dry state;

a plated metal film forming unit for forming a plated metal film on said semiconductor substrate which has been carried in;

a polishing unit for polishing at least part of said plated metal film on said semiconductor substrate; and

a transport mechanism for transporting said semiconductor substrate between said units;

wherein said plated metal film forming unit holds said semiconductor substrate such that a surface, to be plated, of said

semiconductor substrate faces upward, seals a peripheral edge portion of said surface, to be plated, of said semiconductor substrate with a seal in a watertight manner, has an anode disposed above said surface to be plated in proximity to said surface to be plated, has a cathode electrode for passing an electric current in contact with said semiconductor substrate, and performs plating while a plating liquid is held in a space formed by said surface, to be plated, of said semiconductor substrate and said seal.

40. The semiconductor substrate processing apparatus according to claim 39, wherein plating is performed, while a plating liquid impregnated material comprising a water retaining material is placed in a space formed between said surface to be plated and said anode.

41. A semiconductor substrate processing apparatus, comprising:

a carry-in and carry-out section for carrying in and carrying out a semiconductor substrate having a surface on which a circuit is formed, in a dry state;

a plated metal film forming unit for forming a plated metal film on said semiconductor substrate which has been carried in;

a polishing unit for polishing at least part of said plated metal film on said semiconductor substrate; and

a transport mechanism for transporting said semiconductor substrate between said units;

wherein said plated metal film forming unit comprises a substrate holding portion for holding said semiconductor substrate

such that a surface, to be plated, of said semiconductor substrate faces upward, an anode disposed above said surface, to be plated, of said semiconductor substrate, a cathode electrode for passing an electric current in contact with said semiconductor substrate, and a pure water supply nozzle, and simultaneously cleans said semiconductor substrate and said cathode electrode by supplying pure water from said nozzle after completion of plating treatment.

42. A semiconductor substrate processing apparatus, comprising:

a carry-in and carry-out section for carrying in and carrying out a semiconductor substrate having a surface on which a circuit is formed, in a dry state;

a plated metal film forming unit for forming a plated metal film on said semiconductor substrate which has been carried in;

a polishing unit for polishing at least part of said plated metal film on said semiconductor substrate; and

a transport mechanism for transporting said semiconductor substrate between said units;

wherein said plated metal film forming unit holds said semiconductor substrate such that a surface, to be plated, of said semiconductor substrate faces upward, seals a peripheral edge portion of said surface, to be plated, of said semiconductor substrate with a seal in a watertight manner, has an anode disposed above said surface to be plated in proximity to said surface to be plated, has a cathode electrode for passing an electric current in contact with said semiconductor substrate, and performs plating while a plating liquid is held in a space sealed in a watertight

manner and formed between said surface to be plated and said anode.

43. The semiconductor substrate processing apparatus according to claim 42, wherein plating is performed, while a plating liquid impregnated material comprising a water retaining material is placed in a space formed between said surface to be plated and said anode.

44. A semiconductor substrate processing apparatus, comprising:

a carry-in and carry-out section for carrying in and carrying out a semiconductor substrate having a surface on which circuit is formed, in a dry state;

a plated metal film forming unit for forming a plated metal film on said semiconductor substrate which has been carried in;

a polishing unit for polishing at least part of said plated metal film on said semiconductor substrate; and

a transport mechanism for transporting said semiconductor substrate between said units;

wherein said plated metal film forming unit can perform pretreatment, plating treatment, and water washing treatment.

45. A semiconductor substrate processing apparatus, comprising:

a carry-in and carry-out section for carrying in and carrying out a semiconductor substrate having a surface on which a circuit is formed, in a dry state;

a barrier layer forming unit for forming a barrier layer on

said semiconductor substrate which has been carried in;

a seed layer forming unit for forming a seed layer on said barrier layer;

a plated metal film forming unit for forming a plated metal film on said seed layer;

a bevel etching unit for etching and removing a metal film formed at an edge portion of said semiconductor substrate;

an annealing unit for annealing said plated metal film;

a polishing unit for polishing said plated metal film and/or said seed layer on said semiconductor substrate;

a cleaning unit for cleaning and drying said semiconductor substrate whose plated metal film has been polished;

a cover plating unit for forming a plated cover layer on said plated metal film; and

a transport mechanism for transporting said semiconductor substrate;

wherein said barrier layer forming unit, said seed layer forming unit, said plated metal film forming unit, said bevel etching unit, said annealing unit, said polishing unit, said cleaning unit, and said cover plating unit are interchangeable.

46. An electroless plating method, characterized by continuously performing the steps of:

holding a substrate with a surface to be plated facing upward by holding means having a mechanism for holding an electroless plating treatment liquid on said substrate;

supplying said electroless plating treatment liquid onto said surface, to be plated, of said substrate; and

performing electroless plating treatment while storing and holding said electroless plating treatment liquid on said surface, to be plated, of said substrate for a predetermined time.

47. The electroless plating method according to claim 46, characterized in that the step of bringing said electroless plating treatment liquid supplied onto said surface, to be plated, of said substrate into contact with said surface to be plated is provided between said step of supplying said electroless plating treatment liquid and said step of performing electroless plating treatment while storing and holding said electroless plating treatment liquid on said surface, to be plated, of said substrate for a predetermined time.

48. The electroless plating method according to claim 46, wherein said step of performing electroless plating treatment while storing and holding said electroless plating treatment liquid on said surface, to be plated, of said substrate for a predetermined time is performed in such a state that said substrate is in a stationary state.

49. The electroless plating method according to claim 46, wherein said plated surface after treatment with said electroless plating treatment liquid is cleaned by pouring a cleaning liquid, and is then spin-dried.

50. An electroless plating method for treating a surface, to be plated, of a substrate by bringing an electroless plating

treatment liquid in contact with said surface to be plated, characterized in that:

said electroless plating treatment liquid is brought into contact with said surface, to be plated, of said substrate in such a state that said substrate is heated to a temperature higher than electroless plating treatment temperature, and/or said electroless plating treatment liquid is brought into contact with said surface, to be plated, of said substrate in such a state that a temperature of an atmosphere for performing electroless plating is substantially equal to electroless plating treatment temperature.

51. An electroless plating apparatus, comprising:

holding means for holding a substrate in such a state that a surface, to be plated, of said substrate faces upward;

a plating liquid holding mechanism for sealing a periphery of said surface, to be plated, of said substrate held by said holding means; and

electroless plating treatment liquid supply means for supplying an electroless plating treatment liquid to, and storing said electroless plating treatment liquid on, said surface, to be plated, of said substrate sealed with said plating liquid holding mechanism.

52. The electroless plating apparatus according to claim 51, comprising heating means provided close to said substrate

53. An electroless plating apparatus, comprising:

holding means for holding a substrate in such a state that a surface, to be plated, of said substrate faces upward; and

electroless plating treatment liquid supply means for supplying an electroless plating treatment liquid to said surface, to be plated, of said substrate;

wherein said electroless plating treatment liquid supply means is disposed above said surface to be plated, and adapted to supply said electroless plating treatment liquid in a scattered state.

54. The electroless plating apparatus according to claim 53, comprising heating means provided close to said substrate.

55. A substrate processing apparatus having substrate holding means for holding a substrate and adapted to perform transportation or treatment of said substrate while holding said substrate by said substrate holding means, characterized in that:

a sensor for detecting substrate surface state is provided in said substrate holding means, and a state of a substrate surface is detected based on a signal detected by said sensor during transportation or treatment of said substrate.

56. The substrate processing apparatus according to claim 55, wherein said sensor comprises a sensor for film thickness measurement.

57. A substrate processing apparatus having substrate holding means for holding a substrate and adapted to perform

transportation or treatment of said substrate while holding said substrate by said substrate holding means, characterized in that:

a sensor for detection substrate surface state is provided at a predetermined position where said substrate makes an approach during transportation or treatment of said substrate by said substrate holding means, and a state of a substrate surface is detected based on a signal detected by said sensor when said substrate approaches said sensor.

58. The substrate processing apparatus according to claim 57, wherein said sensor is movable.

59. The substrate processing apparatus according to claim 57, wherein said sensor comprises a sensor for film thickness measurement.

60. A substrate processing apparatus having substrate holding means for holding a substrate and a substrate processing module for processing said substrate, and adapted to carry said substrate held by said substrate holding means into or out of said substrate processing module, characterized in that:

a sensor for detecting substrate surface state is provided near a substrate carry-in and carry-out opening of said substrate processing module, or near a position in said substrate processing module at which said substrate is processed, and a state of a substrate surface is detected based on a signal from said sensor when said substrate is carried into or carried out of said substrate processing module, or when said substrate is processed in said

substrate processing module.

61. The substrate processing apparatus according to claim 60, wherein said sensor comprises a sensor for film thickness measurement.

62. A substrate processing apparatus, comprising:

a carry-in and carry-out section for carrying in and carrying out a semiconductor substrate having a surface on which a circuit is formed, in a dry state;

a plated metal film forming unit for forming a plated metal film on said semiconductor substrate which has been carried in;

an annealing unit for annealing said semiconductor substrate;

a polishing unit for polishing at least part of said plated metal film on said semiconductor substrate; and

a transport mechanism for transporting said semiconductor substrate between said units.